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Analysis and Remediation of Student Misconceptions Using P2OC2R-Based Learning Model on Fungi Materials in Senior High School

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Abstract

Misconceptions are ideas from students that are not accordance with the conception agreed upon by scientists who are believed to be true. Misconceptions need to be identified and remedied so that they don't have a negative impact on the acceptance and understanding of further concepts. The purpose of this study was to analyze the profile of students' conceptions using the three-tier diagnostic test before and after of the P2OC2R learning model treatment, and to analyze the effect of applying the P2OC2R learning model to students' conceptions by comparing the results of the pretest and posttest. This research was a quasi-experimental research with one group pretest-posttest design, namely adaptation of three tier questions, testing pretest questions, P2OC2R treatment, testing posttest questions, analyzing research results with category tables and criteria for misconception levels, comparing pretest and posttest results, and drawing conclusions. The subjects in this study were 21 students of tenth grade who had received fungi material. The results showed that the average student conception profile before treatment was 44.93% misconceptions, 29.81% don't understand concepts, and 25.26% understand concepts. The criteria for student misconceptions showed as many as 33.33% high misconceptions, 42.86% moderate misconceptions and 23.81% low misconceptions. After P2OC2R learning treatment, the average conceptual profile of students with misconceptions decreased to 23.18%, students didn't understand concepts decreased to 7.67% and students understood concepts increased to 69.15%. Meanwhile, the criteria for students with high misconceptions decreased to 0%, moderate misconceptions decreased to 28.57% and low misconceptions increased to 71.43%. This proves that there is a significant effect or change before and after P2OC2R learning treatment.

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INTRODUCTION

Biology is the study of living things that contains various concepts that must be studied. In understanding a concept, it is necessary to understand the basic concepts to be able to understand it. The concept can be interpreted as a collection of several facts that have the same characteristics or attributes (Ibrahim, 2012). Attributes are special characteristics that can distinguish between concepts and non-concepts. Concepts in biology learning are interrelated and related to each other. The relationship between the concepts of Biology and the process of science makes Biology a complex science. The relationship between concepts in biology is that these concepts will be the basic elements that build theories, laws, principles, procedures, and so on that are learned or taught. Teaching the wrong or incomplete concept will trigger a connection to the concept to be studied further which will later lead to conceptual defects or misunderstandings (Keskin & Kose, 2015).

During the learning process, students accept the right concept and wrong concept, the initial concept that students have is called preconception. If a student's wrong preconception is difficult to change and students tend to return to their preconception even though they have been introduced to the truth concept according to experts, this is called a misconception (Ibrahim, 2012). Misconception is a wrong concept that a person has and still believes in the concept even though he has been taught the correct scientific concept (Ibrahim, 2012).

Misconceptions are ideas from within students that are not in accordance with the conception agreed upon by scientists who are believed to be true (Ibrahim, 2012). Misconception is also a scientifically inaccurate understanding of a concept (Suparno, 2013). In a lesson, the misconceptions experienced by students are different from one another. Factors causing misconceptions can be from students themselves in the form of simple and incomplete pre-concepts, then from learning resources such as text books that contain wrong material, wrong writing that causes misconceptions, then teachers also experience misconceptions or lack of mastery of the concepts being taught and the methods used inappropriately so that it triggers misconceptions (Ibrahim, 2012). If misconceptions are left unchecked, misconceptions will have an impact on the stage of students' cognitive development that is not in accordance with scientific concepts that are believed to be true, students' reasoning will be limited and wrong, and students' inability to capture, understand and apply the concepts that have been learned.

Students still experience many misconceptions on some topics or basic concepts in biology. One of the materials in Biology lessons that often find misconceptions is Fungi material. The concept of Fungi is considered difficult by most students because the concept of fungi is complex, abstract, boring, uses Latin names, classifications and the scope of the material is quite broad. This is supported by previous research by Kurniawati (2019) at MA Negeri 2 Gresik, in the fungi concept, students experience the most misconceptions about the role concept of the Basidiomycota division by 84%, the difference in sexual and asexual life cycles by 80%, the role of the zygomycota division by 76%, and identification of the structure of the fungal division of Basidiomycota by 72%.

Misconceptions in Fungi material need to be identified, if they are not immediately identified and continue to be stored in students' memory, it will have a negative impact on the acceptance, understanding and application of subsequent material concepts, because concepts in biology are related (Ramadhani et al, 2016). Identification of misconceptions is very important to do as a way to find out the profile of students' misconceptions on Fungi material. Identification of students' misconceptions can be done using one type of diagnostic test method, namely the Three-tier multiple choice diagnostic test which is a combination of a two-tier test with a confidence rating (CR). Gurel, et al., (2015) stated in their research that, the Three-Tier Test is considered accurate in detecting misconception profiles in students, because the test can detect a lack of knowledge through the level of confidence. This diagnostic test can detect students who understand the concept, students who have misconceptions, and students who do not understand the concept. Three-Tier Test consists of three parts. The first part contains questions that contain various answer choices. The second part includes reasons that refer to the answers in the early part. The third part consists of the confidence students' level in answering the first level, and the second level with choice of responses in the form of sure

and not sure (Asih, 2021).

Identification of students' misconception profiles is not enough to fix students' misconceptions. Known student misconceptions must be addressed or reduced immediately so as not to interfere with the process of acceptance, development and application of new concepts further, and does not have an impact on student learning outcomes (Mu'arikha, 2021). Therefore there must be an effort to revitalize learning through remediation. Remediation is defined as an action or healing treatment (KBBI, 2017). Remediation is learning activities directed at overcoming students' learning difficulties by changing, improving or clarifying their frame of mind. In the learning process, remediation is carried out to justify the misconceptions students have. In changing students' misconceptions is not easy, changing misconceptions to become scientifically correct concepts cannot be separated from the thinking process which includes the process of recognizing, evaluating conceptions beliefs and then deciding whether to reconstruct or not reconstruct these conceptions and beliefs with new ones (Ibrahim, 2018).

There are various types of remedial teaching methods including cognitive conflict approaches, demonstrations, experiments, analogy for pair interaction, meta learning, graphic organizers and interactive multimedia (Zhukhruf, 2016). Cognitive conflict strategy is a conceptual change strategy in an effort to change students' misconceptions towards the correct concept (Ma'rifah, 2012). Cognitive conflict is an important factor in concept change. Cognitive conflict can be generated by an imbalance situation in the form of dissatisfaction caused by a conflict between what is seen (new information) and what is owned in the cognitive structure (Ibrahim, 2018). With cognitive conflicts within students in order to justify misconceptions through the assimilation process or change misconceptions by accommodating new knowledge. Cognitive conflict management methods for teachers and students are very important in learning because cognitive conflicts can lead to destructive or misconceptions as well as constructive results (Ibrahim, 2018). Therefore, it is difficult for teachers to change students' wrong preconceptions simply by the lecture method, without going through a learning process that involves students actively seeking solutions to their cognitive conflicts.

There are many learning models used to remediate misconceptions, for example, the NHT learning model (Anggraini, 2013), think-pair-share (Al-Kussami, 2013), make a match (Ichtiyaranisa, 2013), guided discovery-inquiry (Lestari, 2014) and TGT assisted by mind mapping (Utami, 2014). However, the learning model above is deemed insufficient to present cognitive conflicts in students because the syntax of some of these learning models is different from the syntax of learning models based on cognitive conflict. Cognitive conflict-based learning model has the following syntax: activation of preconceptions and misconceptions, presentation of cognitive conflicts, discovery of concepts and similarities and reflection (Mufit, 2018). One of the learning models that can present this cognitive conflict is the P2OC2R model (Probing, Propose Previous Conception, Observation, Clarification & Confirmation and Reinforcement) which is a modification of the CAM (Concept Attainment Model) learning model because the syntax of P2OC2R learning is almost the same as the syntax of cognitive conflict-based learning models. Ibrahim's research (2019) has succeeded in modifying the CAM learning model which is carried out with learning procedures from finding concepts through examples and non-examples to learning that is carried out starting from the conceptions possessed by students, then these conceptions are verified using facts to further formulate generalizations. In this concept test, students are in a situation of experiencing cognitive conflict due to their misconceptions being faced with different facts. This model begins with exploring students' conceptions by means of a teacher presenting a series of questions that are guiding and exploring so that a thought process occurs that links the knowledge and experience of each student with the new things being studied (Alfian, 2021). Previous research on remediation of misconceptions with the CAM learning model has been carried out by Afandi (2014) on cell metabolism material with the result of an increase in mastery of concepts (NGain) of 15.67. And research by Alfian et al (2021) which proves that there is a change in student's understanding of the concept of science, which was originally only 4% of understanding to 93% with the P2OC2R learning model.

Based on the explanation above, there is a need for research to identify the misconceptions experienced by students as well as remediation of students' misconceptions with P2OC2R learning. This study aims to analyze the profile of students' conceptions on Fungi material using the three-tier diagnostic test and

remediate students' misconceptions through P2OC2R learning.

RESEARCH METHOD

The type of research used is a quasi-experimental research. Where the quasi-experimental research design used is to determine the effect of students' misconception remediation learning using the P2OC2R learning model on students' conceptual profiles. The research design used was One group pretest-posttest design. The research design consisted of 3 steps, namely pretest which shows the profile of students' conceptions before learning treatment, P2OC2R treatment and posttest which shows the profile of students' conceptions after learning treatment. The effect of treatment was measured by comparing the results of the pretest and posttest.

This research was carried out from October 2021 to January 2022 with the research target of 21 students of class X Mipa 1, SMA Labschool Unesa who had received Fungi material and a Biology teacher. The instrument used in this study was a three-tier multiple choice diagnostic test which was adapted from Kurniawati's research (2019). This research consists of 3 stages, namely preparation, implementation and completion.

First, the preparation stage is carried out by adapting the diagnostic question instrument adapted from Kurniawati's research (2019) which has been validated by experts, making interview instruments and the process of making P2OC2R-based learning tools which include lesson plans and Powerpoint media. *Second*, the data collection stage whose activities consist of pretest, conducting interviews, treatment in the form of applying remediation learning using powerpoint and lesson plans based on P2OC2R syntax and posttest. *Third*, the completion stage consists of data analysis of pretest, posttest, interviews, implementation of learning and analysis of the effect of treatment on the application of P2OC2R learning on students' conceptions and drawing conclusions.

The pretest and posttest data analysis technique used a table of student conception categories with a three-tier multiple choice diagnostic test instrument as shown in **Table 1** below:

Table 1. Categories of Students Conception

No.	Level I	Level II	Level III	Category Student Concept
1	Right	Right	Certain	Understand Concept
2	Right	Right	Not sure	Don't Understand the Concept
3	Right	Wrong	Certain	Misconception
4	Right	Wrong	Not sure	Don't Understand the Concept
5	Wrong	Right	Certain	Misconception
6	Wrong	Right	Not sure	Don't Understand the Concept
7	Wrong	Wrong	Certain	Misconception
8	Wrong	Wrong	Not sure	Don't Understand the Concept

Source: Gurel et al. (2015).

The results of students' answers show the category of students' conceptions which consist of understanding concepts, misconceptions and not understanding concepts. This category of student misconceptions is processed in the form of percentages, to find out the percentage of each category it can be calculated using the following formula:

$$\boldsymbol{P = \frac{f}{N} x\ 100\%}$$

Information:

P= Number percentage (%) per group.

f= Number of students in each group (Understand Concepts, Do Not Understand Concepts, and Misconceptions).

N= Number of individuals

The misconceptions that occur in students are then grouped again into three criteria, as shown in **Table**

2 below:

Table 2. Misconception Criteria

Percentage (%)	Criteria
0.00 – 30.00	Low
30.00 – 60.00	Moderate
60.00 – 100.00	High

Source: (Arikunto, 2013).

Analysis of the results of the interview by looking at the factors that cause misconceptions in students include: students, teachers, and teaching methods. The learning implementation sheet is given to a Biology teacher and a college student at the time of learning who will be observed with the answer "Yes" or "No". The results of the implementation observations will be analyzed with the criteria as in **Table 3** below:

Table 3. Implementation Criteria Sheet

Execution	Score
Yes	1
No	0

Source: (Sugiyono, 2013)

$$Implementation = \frac{Obtained\ Score}{Maximal\ Score}\ x\ 100\%$$

The percentage obtained is then interpreted in **Table 4** below:

Table 4. Interpretation Criteria for Learning Implementation Score

Score (%)	Interpretation Criteria
75 ≤ P < 100	Very well executed
50 ≤ P < 74	Well done
25 ≤ P < 49	Not done well
0 ≤ P < 24	Not done

Source: (Arifin, 2010)

Analysis of the impact of the P2OC2R learning model on students' conceptions by comparing the conception profile before treatment or pretest and student conception profile after treatment or posttest as shown in **Table 5** below:

Table 5. Research Design One group pretest posttest

Pretest	*Treatment*	*Posttest*
O1	X	O2

Source: (Fraenkel & Wallen, 2012)

O1 X O2, where O1 is the pretest, X is the P2OC2R learning treatment and O2 is the posttest.

RESULTS AND DISCUSSION

This research produces data in the form of the implementation of P2OC2R learning, the percentage of students' conceptions profile before and after the learning treatment, the criteria for the level of students' misconceptions before and after the learning treatment, concepts that have misconceptions and the impact of the P2OC2R learning model on students' conceptions by comparing pretest and posttest.

Based on the results of observations using the learning implementation instrument in the P2OC2R remediation learning treatment, the data obtained are presented in **Table 6** below:

Table 6. Learning Implementation Recapitulation

Aspects Observed	Execution			
	Meet. 1		Meet. 2	
	O1	O2	O1	O2
The teacher shows a powerpoint slide containing about mushrooms, students observe the teacher's powerpoint and do a critical study. **(Probing)**	1	1	1	1
The teacher asks questions, what are the essential characteristics of mushrooms, students discuss and make critical observations of the examples of concepts given. **(Probing)**	1	1	1	1
The teacher asks students to write all the predictions of the mushroom concept, students take turns expressing their ideas, assisted by the teacher entering all the characteristics of the mushroom concept into powerpoint. **(Present Previous Conception)**	1	1	1	1
The teacher displays a new concept to eliminate the wrong feature or add a new feature that is relevant, Students discuss and eliminate irrelevant features or add new features that are more relevant. **(Observation)**	1	1	1	1
The teacher facilitates students to eliminate irrelevant trait predictions and find relevant traits that are shared by all examples of mushroom concepts. **(Confirmation and Clarification)**	1	1	1	1
The teacher facilitates students to ascertain the characteristics of the mushroom concept that has been found and formulate an understanding of the mushroom concept. **(Reinforcement)**	1	1	1	1
Total Score	6	6	6	6
Maximum Score	6	6	6	6
Percentage(%)	**100%**			
Category	**Very Well Executed**			

Information:

Meet. 1: 1st Meeting — **O1:** 1st Observer

Meet. 2: 2nd Meeting — **O2**: 2nd Observer

Based on Table 6, the implementation of remediation learning based on the P2OC2R learning model is stated to be **very well implemented or executed**. In addition, based on the test results which include the results of the pretest and posttest, it can be seen the average percentage of students' conceptions of the concept of Fungi material which is presented in **Figure 1** as follows:

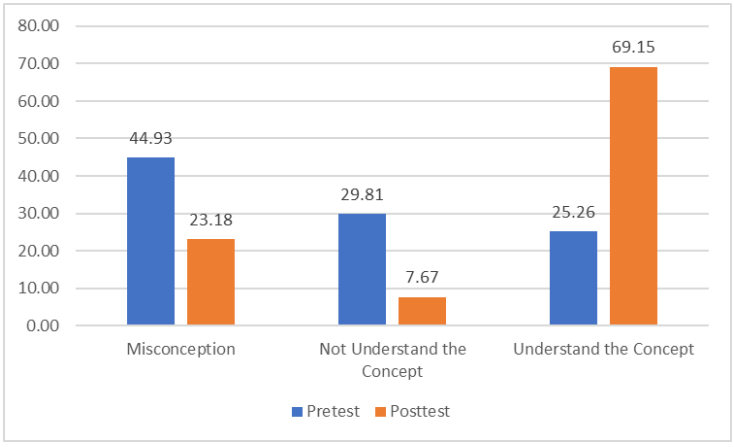

Figure 1. Total Average Student's Conceptual Comprehension Diagram in Fungi Material

Figure 1 shows that in the pretest before treatment, on average, students experienced misconceptions

as much as 44.93%, did not understand the concept as much as 29.81% and understood the concept as much as 25.26%. After the P2OC2R learning treatment, students' misconceptions decreased to 23.18%, students did not understand the concept also decreased to 7.67% and students understood concepts increased to 69.15%.

The results also showed that there were criteria for the level of misconception experienced by students which were divided into 3 categories, namely high, moderate and low misconceptions. High misconceptions when the percentage of misconceptions is more than 60%, moderate misconceptions if the percentage of misconceptions is between 30%-60% and low misconceptions if the percentage of misconceptions is less than 30% (Arikunto, 2013). The average data on students' misconception level criteria before and after treatment are presented in **Figure 2** below:

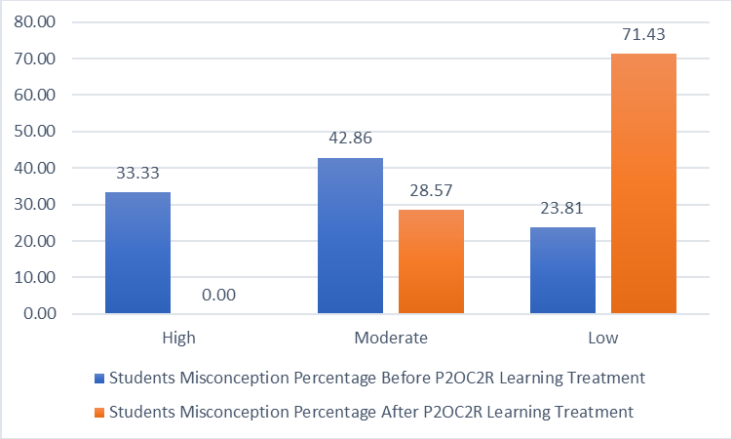

Figure 2. Criteria Diagram for the Level of Student's Misconception

Based on Figure 2, it can be seen that the test results before treatment were 33.33% high misconceptions, 42.86% moderate misconceptions and 23.81% low misconceptions. While the results of the test after treatment obtained results as much as 0% high misconceptions, 28.57% moderate misconceptions and 71.43% low misconceptions.

The results also show the percentage of students' conceptions of each item related to the concepts in the fungi material. The percentage of students' conceptions on each item is presented in **Table 7** below:

Table 7. Recapitulation of the percentage of misconceptions, understand the concept, and do not understand the concept for each indicator (Pretest & Posttest)

Indicator	Percentage of Student Conception (%)					
	Pretest			Posttest		
	M	NUC	UC	M	NUC	UC
Define the characteristics of the kingdom of fungi.	52	19	29	0	0	100
Distinguish between the kingdom of fungi and algae.	52	19	29	19	0	81
Determine the division of the fungus based on the characteristics found.	19	10	71	0	5	95
Determine the role of member species of Zygomycota.	57	19	24	0	5	95
Determine the role of member species of Ascomycota.	48	14	38	0	0	100
Determine the useful species of Basidiomycota members.	48	24	28	33	19	48

Determining the negative role of Deutromycota member species.	33	24	43	43	19	38
Identify the body structure of Rhizopus stolonifera.	24	24	52	0	0	100
Identify the body structure of Morchella esculenta.	29	38	33	0	0	100
Identify the body structure of the White Oyster Mushroom (Pleurotus florida).	81	19	0	76	19	5
Determine the correct statement about Zygomycota.	38	19	43	0	0	100
Determine the correct statement about Ascomycotina.	48	38	14	0	0	100
Determine the correct statement about the Basidiomycota	28	48	24	5	5	90
Determine the correct statement about the Deutromycota.	48	19	33	33	14	52
Distinguish between sexual and asexual reproduction.	71	29	0	71	10	19
Determining the asexual reproduction of fungi based on the characteristics found	62	28	10	43	33	24
Analyzing the way of reproduction in each division through life cycle drawings.	43	57	0	62	10	28
Analyze the structure that plays a role in the sexual life cycle in Ascomycota.	43	43	14	14	0	86
Classification of fungi based on sexual reproduction	43	33	24	10	0	90
Classify fungi based on the composition of the cell wall	43	57	0	67	14	19
Determining the location of fungal hyphae on host plants	19	52	29	0	0	100
Determine the symbionts that make up the lichen	62	10	28	10	0	90
Determine the correct statement about the parasexual phenomenon in fungi	43	43	14	48	24	28

Information:

M: Misconception **NUC:** Not Understand the Concept

UC: Understand the Concept

Based on **Table 7**, it can be seen that the highest misconceptions experienced by students during the pretest were on the indicator Identifying the body structure of Basidiomycota Fungi by 81%, and the indicator Distinguishing between sexual and asexual reproduction as much as 71%. While the results of the posttest, the highest misconception lies in the same indicator, namely Identifying the body structure of Basidiomycota fungi as much as 76% and the indicator Distinguishing between sexual and asexual reproduction as much as 71%.

The results of the research at X Mipa 1 SMA Labschool State University of Surabaya showed that the average conception profile of students before treatment was 44.93% misconceptions, 29.81% do not understand concepts and 25.26% understand concepts. The criteria for student misconceptions are also divided into 3, namely high, medium and low. The results of the pretest before treatment showed as many as 33.33% high misconceptions, 42.86% moderate misconceptions and 23.81% low misconceptions. The existence of students' misconceptions, understand concepts, and do not understand concepts because each student has a different understanding and cognitive structure of a concept being studied (Suparno, 2013).

The category of students who understand the concept are students who have higher knowledge than students with other conception categories. The criteria for students to understand the concept are if the first tier and second tier students answer correctly and believe in the answer. Students who understand the concept can build between the concepts they have just received with other concepts that have been previously owned and are able to explain them correctly (Andriyani, 2015; Iriyanti et al, 2017). Students understand the concept means that students not only memorize the concept, but can re-express the concept in another form so that it is easy to understand the meaning but does not change the meaning scientifically (Machsunah, 2019).

The category of students who do not understand the concept are students who are not sure of their answers to the first and second level questions even though the answers are correct (Gurel et.al, 2015). The lack of understanding of concepts in students is because most students have difficulty learning the concepts of fungi material which are complex, abstract, boring concepts, using Latin names, classification and a fairly wide range of material for students (Kurniawati, 2019).

Students who experience conceptual errors (misconceptions) are shown when students have wrong answers to first-level and/or second-level questions but believe in the answers (Gurel et al, 2015). Misconceptions are still experienced by students even though students have received material on fungi. This shows that the misconceptions that occur in students are difficult to change and tend to persist or are resistant (Ibrahim, 2012). When students' memory or retention of the concepts they have learned decreases, misconceptions easily occur again in students. The high level of student misconceptions is also influenced by student interest in learning, students with low interest in learning have a higher level of misconception (Ulfah & Fitriani, 2017).

In the indicator of identifying the body structure of Basidiomycota mushrooms, students are asked to determine the spore-producing structure of white oyster mushrooms. Students answered the first level questions incorrectly, namely basidiospores and at the second level students answered an average of basidiospores producing 4 sexual spores containing four haploid nuclei. The correct concept is that the spore-producing structure in white oyster mushrooms is a basidium, the basidium is located on the surface of the lamella (blade) under the hood of the basidiocarp, at each end of the basidium it will produce 4 sexual spores called basidiospores. Except for Agaricus bisporus, only two basidiospores are produced in the basidium (Campbell et al, 2009).

In the Distinguishing indicator between sexual and asexual reproduction, students are asked to distinguish why the sexual reproduction of fungi is more dominant than the asexual reproduction. Students answered the first level questions incorrectly, namely in the sexual reproduction of fungi germination occurs because at the asexual reproduction stage there is no spore germination and at the second level, the prominent feature in the sexual reproduction life cycle is spore germination, with spore germination it will cause the growth of mycelium. The correct concept is that in the sexual reproduction of fungi, Plasmogamy first, produces a dikaryotic mycelium that can last for several months, then karyogamy occurs, whereas in asexual reproduction this does not occur. A prominent feature of sexual reproduction is the fusion of the cytoplasm which produces a dikaryotic stage and the union of the nucleus produces a diploid stage (Campbell et al, 2009).

The causes of misconceptions obtained from the results of interviews with students indicate that there are still difficulties in understanding a difficult and abstract concept, the many scientific terms in this Fungi material are also the cause of students having difficulty understanding the material, so that the concepts that students receive in themselves have not complete and students find it difficult to relate one concept to

another and become the cause of misconceptions (Kurniasih and Nukhbatul, 2017). In addition, the teacher teaches by the lecture method. Explanation of immature material concepts because they only use the lecture method will make it difficult for students to understand concepts, especially on abstract material concepts (Laksana, 2016). Teaching methods using the teacher center system will make it difficult for students to understand the right concepts and are prone to causing students to experience misconceptions (Seraphin et al., 2012). This is because the lecture method can cause students to get bored and sleepy so that the material is not received in its entirety.

This P2OC2R learning treatment model is the result of a modification of the CAM learning model (concept attainment model) which was originally learning from "finding" concepts through examples and non-examples, modified into learning that was carried out starting from the conceptions possessed by students, then these conceptions were verified using facts for further generalizations are formulated. In this modified learning strategy, students do two things simultaneously, namely learning concepts as well as confirming the conceptions they already have. Learning concepts in this way is very interesting, because it has the potential to integrate cognitive conflicts, due to differences in students' conceptions of facts (Ibrahim, 2018)

The treatment of the P2OC2R learning model is carried out in an online meeting via Google Meet assisted by powerpoint slides. The results of the implementation of the remediation learning treatment based on the P2OC2R learning model showed a percentage of 100% with a very good interpretation. In this study, students' conceptions of the fungi concept must be explored, to explore the initial conception it is necessary to ask probing questions. Furthermore, students are scaffolded in order to provide responses to questions. Student responses were recorded, identified and inventoried. The next stage is the student's conception is tested with facts and requires students to make observations (Observations). Based on the results of further observations, they confirm/test and clarify their conceptions with facts (Confirmation and Clarification). At this stage students make observations, using the results of observations to test the truth of the conception. Truth in science is determined by facts. So that learning outcomes are not easily lost, the teacher strengthens (Reinforcement), namely by presenting examples of other concepts that strengthen the newly formed student conceptions (Ibrahim, 2018). Treatment is carried out not only on concepts that are not understood and have been misconception, but also on all concepts, considering that students' conceptions are different. In detail, the treatment was carried out for each concept following the P2OC2R syntax for related concepts. Treatment is carried out until the whole concept. After the treatment of all concepts is completed, a second test is carried out, namely the posttest.

The posttest results after the P2OC2R learning treatment showed that the average conception profile of students with misconceptions decreased from 44.93% to 23.18%, students did not understand the concept also decreased from 29.81% to 7.67% and students understood concepts increased from 25.26% to 69.15%. The criteria for students' misconceptions are divided into 3, namely high, medium and low which also experienced changes after the P2OC2R learning treatment. The posttest results showed that the percentage of students with high misconceptions decreased from 33.33% to 0%, moderate misconceptions decreased from 42.86% to 28.57% and low misconceptions increased from 23.81% to 71.43%. This proves that there is a significant effect or change before and after the P2OC2R learning treatment.

CONCLUSION

Based on the results of the study, it can be concluded that the average conception profile of students before treatment was 44.93% misconceptions, 29.81% do not understand concepts, and 25.26% understand concepts. The category of misconceptions showed as many as 33.33% high misconceptions, 42.86% moderate misconceptions and 23.81% low misconceptions. The highest misconception is in the concept of identifying the body structure of Basidiomycota by 81% and distinguishing sexual and asexual reproduction of fungi by 71%. After the P2OC2R learning treatment with 100% implementation, the average conceptual profile of students with misconceptions decreased to 23.18%, students did not understand the concept

decreased to 7.67% and students understood concepts increased to 69.15%. The category of students' misconceptions with high misconceptions decreased to 0%, moderate misconceptions decreased to 28.57% and low misconceptions increased to 71.43%. This proves that there is a significant effect or change before and after the P2OC2R learning treatment.

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